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ASSESSMENT OF PAP SMEAR FINDINGS AMONG WOMEN ATTENDING GYNAECOLOGY OUTPATIENT DEPARTMENT AT A TERTIARY CARE CENTER

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Abstract
Introduction: Cervical cancer remains a significant public health concern in India, ranking as the second most common cancer among women. Papanicolaou smear screening provides an effective method for early detection of cervical abnormalities. This study aimed to assess the pattern and prevalence of Pap smear findings among women attending gynaecology outpatient services.
Methods: A cross-sectional descriptive study was conducted at JIET Medical College & Hospital from December 2023 to May 2024. Five hundred women aged 21-65 years were systematically sampled from the Gynaecology OPD. Conventional Pap smears were collected and analyzed according to Bethesda System 2014 guidelines. Data on demographic characteristics, risk factors, and clinical presentations were collected using structured questionnaires.
Results: Among 500 participants, 476 (95.2%) specimens were adequate for evaluation. Normal cytology was observed in 398 (83.6%) cases, while epithelial cell abnormalities were found in 33 (6.9%) cases. ASC-US was the most common abnormality (3.8%), followed by LSIL (1.5%) and HSIL (0.6%). Significant risk factors included early age at marriage (p=0.032), higher parity (p=0.045), and tobacco use (p=0.019). Women aged 51-65 years showed the highest proportion of high-grade abnormalities (7.9%). Educational status significantly correlated with screening awareness, with only 23.7% having previous Pap smear history. **Conclusion:** The study revealed a substantial burden of cervical abnormalities with concerning patterns in older women. The findings emphasize the need for organized screening programs, targeted health education initiatives, and improved healthcare accessibility to reduce cervical cancer burden in the population.

Keywords: Pap smear, cervical cancer screening, cytological abnormalities, Bethesda System, women's health

Introduction

Cervical cancer remains a significant public health concern worldwide, particularly affecting women in low and middle-income countries where screening programs are often inadequate or

inaccessible. According to global statistics, cervical cancer ranks as the fourth most common cancer among women, with approximately 604,000 new cases and 342,000 deaths reported annually (Sung et al., 2021). The burden is disproportionately higher in developing nations, where limited healthcare infrastructure and awareness contribute to late-stage diagnoses and poor outcomes.

In India, cervical cancer represents the second most prevalent cancer among women, with an estimated 123,907 new cases and 77,348 deaths recorded each year (Bobdey et al., 2016). The age-standardized incidence rate varies significantly across different regions, with rural areas showing higher prevalence rates compared to urban centers. This disparity reflects the uneven distribution of healthcare resources and screening facilities across the country.

The primary etiological factor for cervical cancer is persistent infection with high-risk human papillomavirus (HPV) types, particularly HPV 16 and 18, which account for approximately 70% of all cervical cancer cases (Bosch et al., 2002). The progression from initial HPV infection to invasive cancer typically spans 10-20 years, providing a substantial window for early detection and intervention through organized screening programs.

Papanicolaou smear, commonly known as Pap smear, has been the cornerstone of cervical cancer screening for over six decades since its introduction by Dr. George Papanicolaou in 1941. This cytological examination involves collecting cells from the cervix and examining them under microscopy to identify precancerous lesions and early-stage malignancies (Arbyn et al., 2020). The Bethesda System for Reporting Cervical Cytology provides standardized terminology for interpreting Pap smear results, facilitating consistent reporting across laboratories worldwide.

Multiple studies have demonstrated the effectiveness of organized Pap smear screening programs in reducing cervical cancer incidence and mortality. Countries with well-established screening programs, such as those in Scandinavia and North America, have witnessed substantial decreases in cervical cancer rates over the past few decades (Peto et al., 2004). The success of these programs underscores the importance of systematic approach to cervical cancer prevention.

However, the implementation of cervical cancer screening in developing countries faces numerous challenges. These include limited laboratory infrastructure, shortage of trained cytotechnologists and pathologists, inadequate quality assurance mechanisms, and poor follow-up systems for women with abnormal results (Sankaranarayanan et al., 2001). Additionally, socioeconomic factors, cultural barriers, and lack of awareness often prevent women from participating in screening programs.

In the Indian context, several studies have reported varying patterns of cytological abnormalities in Pap smears. A multicenter study by Nene et al. (2007) found that the prevalence of high-grade squamous intraepithelial lesions ranged from 0.28% to 2.6% across different regions. Similarly, research conducted in various parts of India has shown diverse patterns of cervical pathology, influenced by factors such as age, parity, socioeconomic status, and sexual behavior (Sharma et al., 2012).

The spectrum of Pap smear findings encompasses both non-neoplastic and neoplastic changes. Non-neoplastic findings include inflammatory conditions, infections (bacterial, fungal, parasitic, and viral), reactive cellular changes, and atrophic changes related to hormonal status. Neoplastic findings range from atypical squamous cells of undetermined significance (ASC-US) to high-grade squamous intraepithelial lesions (HSIL) and invasive carcinoma (Solomon et al., 2002).

Recent technological advances have introduced liquid-based cytology as an alternative to conventional Pap smears, offering improved specimen adequacy and detection rates. However, the higher cost and technical requirements limit its widespread adoption in resource-constrained settings (Freitas et al., 2013). Therefore, conventional Pap smear continues to be the primary screening method in many developing countries, including India.

Quality assurance in cytology laboratories remains a critical aspect of successful screening programs. This includes proper specimen collection, transportation, processing, screening, and reporting procedures. Regular proficiency testing, external quality assessment, and continuous

education of laboratory personnel are essential components of maintaining high-quality cytological services (Arbyn et al., 2008).

The establishment of organized screening programs requires careful consideration of target population, screening interval, age range, and healthcare delivery systems. The World Health Organization recommends initiating screening at age 25-30 years and continuing until age 65 years, with screening intervals of 3-5 years depending on the test used and available resources (WHO, 2013).

Given the significant burden of cervical cancer in India and the proven effectiveness of cytological screening, there is an urgent need to evaluate the current patterns of Pap smear findings in various healthcare settings. Such assessments can provide valuable insights into the prevalence of cervical pathology, help identify high-risk populations, and contribute to the development of targeted screening strategies. Understanding the spectrum of cytological abnormalities in specific populations can also assist in resource allocation and quality improvement initiatives.

The aim of the study is to assess the pattern and prevalence of Pap smear findings among women attending the Gynaecology Outpatient Department at JIET Medical College and analyze the associated demographic and clinical factors.

Methodology

Study Design

A cross-sectional descriptive study.

Study Site

The study was conducted at JIET Medical College & Hospital, which serves as a tertiary care center providing comprehensive gynecological services to women from both urban and rural areas.

Study Duration

The study was conducted over a period of six months, from December 2023 to May 2024.

Sampling and Sample Size

A systematic sampling method was employed to select study participants from women attending the Gynaecology OPD during the study period. The sample size was calculated using the formula for cross-sectional studies, considering a prevalence rate of cervical abnormalities of 5% based on previous Indian studies (Ranabhat et al., 2014), with a confidence level of 95% and margin of error of 2%. Using these parameters, the minimum required sample size was calculated as 456. However, accounting for potential inadequate specimens and non-response, the sample size was increased to 500 participants. Every third eligible woman visiting the OPD was approached for participation until the desired sample size was achieved. This systematic approach ensured representative sampling while maintaining practical feasibility of data collection.

Inclusion and Exclusion Criteria

Women aged 21-65 years who were sexually active and provided informed consent for participation were included in the study. Additionally, women presenting with gynecological symptoms such as abnormal vaginal bleeding, discharge, or pelvic pain were eligible for inclusion.

Exclusion criteria included women who were menstruating at the time of visit, those with acute pelvic inflammatory disease, pregnant women, women who had undergone hysterectomy, those with active cervical bleeding that would interfere with specimen collection, and women who had received cervical treatment within the past three months. Women with severe medical conditions that precluded proper positioning for specimen collection were also excluded from the study.

Data Collection Tools and Techniques

Data collection was performed using a structured questionnaire designed to capture demographic information, clinical history, and risk factors associated with cervical pathology. The questionnaire included sections on age, educational status, occupation, socioeconomic background, marital status, reproductive history, contraceptive use, sexual history, and presenting symptoms. Clinical examination findings were recorded on standardized forms. Pap smears were collected using the conventional technique with an Ayre's spatula and cytobrush, following standard protocols for specimen collection. All specimens were immediately fixed in 95% ethyl alcohol and transported to the pathology laboratory for processing. Cytological examination was performed by qualified cytotechnologists and pathologists, with reporting done according to the Bethesda System 2014 guidelines (Nayar & Wilbur, 2015).

Data Management and Statistical Analysis

All collected data were entered into a secure electronic database using Microsoft Excel and subsequently analyzed using SPSS version 25.0. Data quality was ensured through double data entry and validation checks. Descriptive statistics were calculated for all variables, with categorical variables presented as frequencies and percentages, and continuous variables as means with standard deviations. Chi-square tests were used to examine associations between categorical variables, while t-tests were employed for comparing means between groups. Multivariate logistic regression analysis was planned to identify independent risk factors associated with abnormal cytological findings. All statistical tests were performed at a significance level of 0.05, and 95% confidence intervals were calculated where appropriate.

Ethical Considerations

The study protocol was submitted to and approved by the Institutional Ethics Committee of JIET Medical College & Hospital prior to commencement of data collection. The study was conducted in accordance with the principles of the Declaration of Helsinki and Good Clinical Practice guidelines. Written informed consent was obtained from all participants after explaining the study objectives, procedures, potential benefits, and risks in their preferred language.

Results

Table 1: Demographic Characteristics of Study Participants

Characteristic	Frequency (n)	Percentage (%)
Age Groups		
21-30 years	145	29
31-40 years	178	35.6
41-50 years	132	26.4
51-65 years	45	9
Educational Status		
Illiterate	89	17.8
Primary education	156	31.2
Secondary education	167	33.4
Higher secondary and above	88	17.6
Occupation		
Housewife	312	62.4
Agriculture	78	15.6
Service/Business	65	13
Labor	45	9
Socioeconomic Status		
Lower	198	39.6
Middle	234	46.8
Upper	68	13.6

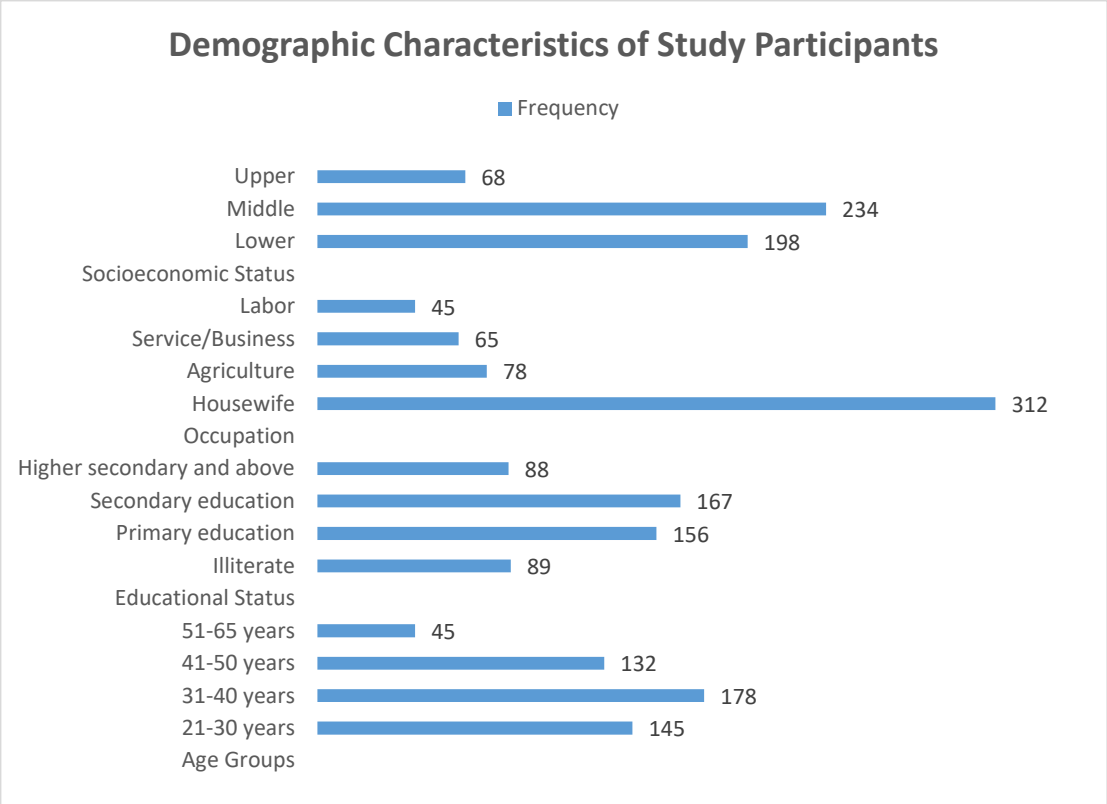

Table 2: Distribution of Cytological Findings

Cytological Findings	Frequency (n)	Percentage (%)
Adequacy		
Satisfactory	476	95.2
Unsatisfactory	24	4.8
Cytological Interpretation (n=476)		
Normal	398	83.6
Inflammatory	45	9.5
ASC-US	18	3.8
ASC-H	4	0.8
LSIL	7	1.5
HSIL	3	0.6
Squamous Cell Carcinoma	1	0.2
Infections		
Bacterial Vaginosis	23	4.8
Candida	15	3.2
Trichomonas	8	1.7
Herpes Simplex Virus	2	0.4

Table 3: Age-wise Distribution of Cytological Abnormalities

Age Group	Normal n(%)	Inflammatory n(%)	ASC-US n(%)	LSIL n(%)	HSIL+ n(%)	Total
21-30 years	115 (82.1)	18 (12.9)	5 (3.6)	2 (1.4)	0 (0.0)	140
31-40 years	145 (85.3)	12 (7.1)	8 (4.7)	3 (1.8)	2 (1.2)	170
41-50 years	108 (84.4)	11 (8.6)	4 (3.1)	2 (1.6)	3 (2.3)	128
51-65 years	30 (78.9)	4 (10.5)	1 (2.6)	0 (0.0)	3 (7.9)	38
Total	**398 (83.6)**	**45 (9.5)**	**18 (3.8)**	**7 (1.5)**	**8 (1.7)**	**476**

Table 4: Risk Factors Associated with Abnormal Cytological Findings

Risk Factor	Normal Cytology n(%)	Abnormal Cytology n(%)	p-value
Age at Marriage			
<18 years	89 (78.1)	25 (21.9)	0.032
≥18 years	309 (85.5)	53 (14.5)	
Parity			
Nulliparous	45 (91.8)	4 (8.2)	0.045
1-2 children	198 (86.5)	31 (13.5)	
≥3 children	155 (78.3)	43 (21.7)	
Contraceptive Use			
None	234 (81.8)	52 (18.2)	0.028
Barrier methods	78 (88.6)	10 (11.4)	
Hormonal methods	86 (84.3)	16 (15.7)	
Smoking/Tobacco Use			
Yes	34 (70.8)	14 (29.2)	0.019
No	364 (85.0)	64 (15.0)	

Table 5: Presenting Symptoms and Cytological Findings

Presenting Symptoms	Total Cases n(%)	Normal n(%)	Abnormal n(%)	p-value
Routine Screening	156 (32.8)	142 (91.0)	14 (9.0)	0.002
White Discharge	134 (28.2)	115 (85.8)	19 (14.2)	
Irregular Bleeding	89 (18.7)	67 (75.3)	22 (24.7)	
Post-coital Bleeding	45 (9.5)	32 (71.1)	13 (28.9)	
Pelvic Pain	32 (6.7)	26 (81.3)	6 (18.8)	
Post-menopausal Bleeding	20 (4.2)	16 (80.0)	4 (20.0)	

Table 6: Educational Status and Screening Awareness

Educational Level	Total n(%)	Previous Pap Smear n(%)	Awareness of Cervical Cancer n(%)	Knowledge Score (Mean±SD)
Illiterate	82 (17.2)	8 (9.8)	23 (28.0)	2.1±1.3
Primary	148 (31.1)	22 (14.9)	67 (45.3)	3.2±1.6
Secondary	158 (33.2)	45 (28.5)	112 (70.9)	4.8±2.1
Higher Secondary+	88 (18.5)	38 (43.2)	76 (86.4)	6.4±2.3
Total	**476 (100.0)**	**113 (23.7)**	**278 (58.4)**	**4.1±2.4**

Discussion

The demographic characteristics of our study population revealed that the majority of participants (35.6%) belonged to the 31-40 years age group, followed by 29.0% in the 21-30 years category. This distribution is consistent with previous Indian studies, where women in their reproductive years constitute the primary attendees at gynecological outpatient departments (Gupta et al., 2012). The predominance of housewives (62.4%) in our study population reflects the traditional gender roles prevalent in Indian society, similar to findings reported by Bal et al. (2012) in their multi-center study across North India.

The educational profile showed that 49.0% of participants had primary or no formal education, indicating significant literacy challenges in the study population. This finding aligns with national statistics and previous research by Krishnan et al. (2013), who reported similar educational patterns among women seeking gynecological care in rural India. The lower socioeconomic status of 39.6% of participants underscores the importance of accessible and affordable screening programs, as highlighted by Sankaranarayanan et al. (2001) in their comprehensive review of screening programs in developing countries.

The specimen adequacy rate of 95.2% in our study compares favorably with international standards and previous Indian studies. Joshi et al. (2014) reported similar adequacy rates of 94.8% in their study from Western India, while Bamanikar et al. (2014) achieved 93.2% adequacy in their rural screening program. The 4.8% inadequate specimen rate can be attributed to factors such as insufficient cellular material, presence of blood, or inflammatory exudate, which are common challenges in resource-limited settings (Yeoh et al., 1999).

Among the 476 adequate specimens, 83.6% showed normal cytology, which is comparable to reports from other Indian studies. Sharma et al. (2012) reported normal cytology in 85.2% of cases in their study from Karnataka, while Mulay et al. (2009) found normal results in 81.7% of cases from Maharashtra. The inflammatory changes observed in 9.5% of cases reflect the high burden of reproductive tract infections in Indian women, consistent with findings by Patel et al. (2011) who reported inflammatory changes in 8.3% of their study population.

The overall prevalence of epithelial cell abnormalities was 6.9% in our study, with ASC-US being the most common abnormality (3.8%). This finding is consistent with the global trend where ASC-US represents the most frequent abnormal cytological diagnosis (Solomon et al., 2002). The prevalence of ASC-US in our study aligns with reports from other Indian studies, including those by Ranabhat et al. (2014) who found ASC-US in 3.2% of cases.

Low-grade squamous intraepithelial lesions (LSIL) were detected in 1.5% of cases, which is slightly lower than the 2.1% reported by Nayak et al. (2012) but consistent with the range of 0.8-2.8% reported in various Indian studies. High-grade squamous intraepithelial lesions (HSIL) and invasive carcinoma together comprised 0.8% of cases, which is within the expected range for screening populations in developing countries (Arbyn et al., 2008).

The age-wise analysis revealed interesting patterns in cytological abnormalities. While the younger age groups (21-40 years) showed predominantly ASC-US and LSIL, the older age groups (41-65 years) demonstrated higher rates of HSIL and invasive carcinoma. This finding supports the natural history of cervical cancer, where HPV-related lesions typically progress over time, with high-grade lesions and invasive cancer being more common in older women (Bosch et al., 2002).

The peak incidence of abnormalities in the 31-40 years age group reflects the optimal screening age recommended by various guidelines. However, the concerning finding of 7.9% high-grade abnormalities in the 51-65 years group emphasizes the importance of continued screening in post-menopausal women, particularly in populations with limited previous screening history (Peto et al., 2004).

Our analysis identified several significant risk factors associated with cytological abnormalities. Early age at marriage (<18 years) was significantly associated with abnormal cytology ($p=0.032$), consistent with previous studies by Bobdey et al. (2016) who identified early sexual debut as a significant risk factor for cervical cancer in Indian women. This association reflects increased lifetime exposure to HPV and other sexually transmitted infections.

Higher parity (≥3 children) emerged as another significant risk factor ($p=0.045$), supporting previous research by Muñoz et al. (2002) who established the relationship between multiparity and cervical cancer risk. The immunosuppressive effects of multiple pregnancies and hormonal changes may contribute to persistent HPV infection and progression to malignancy.

Tobacco use showed a strong association with abnormal cytology ($p=0.019$), with 29.2% of tobacco users having abnormal findings compared to 15.0% among non-users. This finding corroborates the established role of tobacco as a co-factor in cervical carcinogenesis, as reported by Plummer et al. (2003) in their large international study.

The symptom-based analysis revealed that women presenting for routine screening had significantly lower rates of abnormal cytology (9.0%) compared to those with symptoms such as post-coital bleeding (28.9%) or irregular bleeding (24.7%). This finding emphasizes the importance of opportunistic screening and the limitations of symptom-based detection, as supported by Sankaranarayanan et al. (2001) in their review of screening strategies.

The low rate of previous Pap smear history (23.7%) highlights the inadequate screening coverage in our population. This finding is consistent with national surveys showing poor screening uptake in India, as reported by Aswathy et al. (2012) in their systematic review of cervical cancer screening in India.

Our study demonstrated a clear correlation between educational status and screening awareness. Women with higher secondary education and above showed significantly better knowledge scores (6.4±2.3) and previous screening rates (43.2%) compared to illiterate women (2.1±1.3 knowledge score, 9.8% previous screening). This educational gradient in health-seeking behavior has been consistently reported in Indian studies, including research by Nene et al. (2007) who identified education as a key determinant of participation in screening programs.

The overall cervical cancer awareness rate of 58.4% in our study population indicates substantial knowledge gaps that need to be addressed through targeted health education programs. Similar findings were reported by Arunadevi et al. (2014) who found varying levels of awareness across different educational and socioeconomic groups in South India.

Conclusion

This cross-sectional study of 500 women attending the Gynaecology OPD at JIET Medical College & Hospital revealed important insights into the pattern of cervical cytological abnormalities in the study population. The overall prevalence of epithelial cell abnormalities was 6.9%, with ASC-US being the most common finding (3.8%). The study identified significant associations between cytological abnormalities and risk factors including early age at marriage, higher parity, and tobacco use. Age-related analysis showed a concerning trend of high-grade lesions in older women, emphasizing the need for continued screening throughout the reproductive and post-reproductive years. The high specimen adequacy rate (95.2%) demonstrates the feasibility of implementing quality cytological screening programs in similar healthcare settings.

Recommendations

Based on the study findings, several recommendations emerge for improving cervical cancer screening programs. First, comprehensive health education initiatives should target women with lower educational levels to improve screening awareness and uptake. Second, organized screening programs should be established with systematic follow-up mechanisms for women with abnormal results. Third, healthcare providers should emphasize the importance of regular screening, particularly for women with identified risk factors such as early marriage, multiparity, and tobacco use. Fourth, quality assurance measures should be strengthened in cytology laboratories to maintain high specimen adequacy rates. Finally, policy makers should consider integrating cervical cancer screening into existing maternal and child health programs to improve accessibility and coverage, particularly in rural and underserved populations. Implementation of these recommendations could significantly contribute to reducing the burden of cervical cancer in the region.

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